

NARUMI, et al., 10/880,506  
05 January 2006 Amendment  
Responsive to 05 October 2005 Office Action

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**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. and 2. (Canceled)

3. (Previously Presented) An inductive head comprising a lower magnetic core formed on a substrate, a magnetic pole tip layer formed on the lower magnetic core wherein said magnetic pole tip layer comprises three layers of magnetic layer/non-magnetic layer/magnetic layer, an upper magnetic core coupled in its front end to the magnetic pole tip layer, coupled in its rear end to the lower magnetic core, having a width of the front end smaller than that of the rear end, and having at least partially a shape gradually reducing the width from the rear end to the front end, coils disposed between the upper magnetic core and the lower magnetic core, and an insulating layer formed between the coils and the upper magnetic core or the lower magnetic core, wherein the distance between the upper magnetic core and the lower magnetic core in a rear end region away from a air bearing surface in a region connecting the magnetic pole tip layer to said upper magnetic core is shorter than the distance between the top surface of said magnetic pole tip layer in the air bearing surface and said lower magnetic core, and wherein a width of the front end of the upper magnetic core is larger than that of a rear end of the magnetic pole tip layer.

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4. (Currently Amended) The inductive head according to claim 3, comprising a magnetic gap layer formed at least near the air bearing surface on said lower magnetic core, a non-magnetic layer formed in a region such that at least the magnetic gap layer is distanced from the air bearing surface and having a thickness increased with moving away from the air bearing surface, and said magnetic pole tip layer is formed on the magnetic gap layer and the non-magnetic layer.

5. (Canceled)

6. (Previously Presented) The inductive head according to claim 4, wherein said magnetic pole tip layer is formed on the lower magnetic core near the air bearing surface, and is formed on the non-magnetic layer in a region away from the air bearing surface.

7.-11. (Canceled)

12. (Previously Presented) The inductive head according to claim 3, wherein the front end of said upper magnetic core is recessed from the air bearing surface by 0.2 to 3.0  $\mu\text{m}$ .

13. (Canceled)

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14. (Previously Presented) The inductive head according to claim 3, wherein a saturation magnetic flux density of the magnetic pole tip layer is higher than that of any one of the upper magnetic core and the lower magnetic core.

15. (Currently Amended) A magnetic disk apparatus comprising a magnetic recording media, a motor to drive the magnetic recording media, a magnetic head to read from and write onto the magnetic recording media, and a mechanism for positioning the magnetic head, wherein at least one inductive head according to claim 3 is mounted as the magnetic head, a width of the magnetic pole tip layer of said magnetic head in the air bearing surface is not more than 0.5  $\mu\text{m}$ , a saturation magnetic flux density of the magnetic layer consisting of the magnetic pole tip layer is not less than 1.6T, and a coercivity of the magnetic recording media is 317 to 634 kA/m (4.0 to 8.0 kOe), and

said three layers of magnetic layer/non-magnetic layer/magnetic layer of said magnetic pole tip layer have the same shape as viewed from top, and have an angle of extension of 5° to 45°.

16. (Previously Presented) A magnetic disk array apparatus comprising a plurality of magnetic disk apparatuses, wherein at least one inductive head according to claim 3 is mounted as a magnetic head of at least one of the magnetic disk apparatuses, a width of the magnetic pole tip layer of said magnetic head in the air bearing surface is not more than 0.5  $\mu\text{m}$ , a saturation magnetic flux density of the magnetic layer consisting of the magnetic pole tip layer is not less than 1.6T, and the coercivity of a magnetic recording media is 317 to 634 kA/m (4.0 to 8.0 kOe).

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17. (Currently Amended) The magnetic disk apparatus according to claim 15, comprising a magnetic gap layer formed at least near the air bearing surface on said lower magnetic core, a non-magnetic layer formed in a region such that at least the magnetic gap layer is distanced from the air bearing surface and having a thickness increased with moving away from the air bearing surface, and said magnetic pole tip layer is formed on the ~~magnetic gap layer and the non-magnetic layer.~~

18. (Previously Presented) The magnetic disk apparatus according to claim 17, wherein said magnetic pole tip layer is formed on the lower magnetic core near the air bearing surface, and is formed on the non-magnetic layer in a region away from the air bearing surface.

19. (Previously Presented) The magnetic disk apparatus according to claim 15, wherein the front end of said upper magnetic core is recessed from the air bearing surface by 0.2 to 3.0  $\mu\text{m}$ .

20. (Previously Presented) The magnetic disk apparatus according to claim 15, wherein a saturation magnetic flux density of the magnetic pole tip layer is higher than that of any one of at least the upper magnetic core and the lower magnetic core.

21. (Currently Amended) The magnetic disk apparatus according to claim ~~45~~16, comprising a magnetic gap layer formed at least near the air bearing surface on said lower magnetic core, a non-magnetic layer formed in a region such that at

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least the magnetic gap layer is distanced from the air bearing surface and having a thickness increased with moving away from the air bearing surface, and said magnetic pole tip layer is formed on the magnetic gap layer and the non-magnetic layer.

22. (Previously Presented) The magnetic disk apparatus according to claim 21, wherein said magnetic pole tip layer is formed on the lower magnetic core near the air bearing surface, and is formed on the non-magnetic layer in a region away from the air bearing surface.

23. (Currently Amended) The magnetic disk apparatus according to claim 4516, wherein the front end of said upper magnetic core is recessed from the air bearing surface by 0.2 to 3.0  $\mu\text{m}$ .

24. (Currently Amended) The magnetic disk apparatus according to claim 4516, wherein a saturation magnetic flux density of the magnetic pole tip layer is higher than that of any one of at least the upper magnetic core and the lower magnetic core.

25. (Currently Amended) ~~The inductive head according to claim 3, An~~  
inductive head comprising a lower magnetic core formed on a substrate, a magnetic pole tip layer formed on the lower magnetic core wherein said magnetic pole tip layer comprises three layers of magnetic layer/non-magnetic layer/magnetic layer, an upper magnetic core coupled in its front end to the magnetic pole tip layer,

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coupled in its rear end to the lower magnetic core, having a width of the front end smaller than that of the rear end, and having at least partially a shape gradually reducing the width from the rear end to the front end, coils disposed between the upper magnetic core and the lower magnetic core, and an insulating layer formed between the coils and the upper magnetic core or the lower magnetic core, wherein the distance between the upper magnetic core and the lower magnetic core in a rear end region away from a air bearing surface in a region connecting the magnetic pole tip layer to said upper magnetic core is shorter than the distance between the top surface of said magnetic pole tip layer in the air bearing surface and said lower magnetic core, and wherein a width of the front end of the upper magnetic core is larger than that of a rear end of the magnetic pole tip layer, wherein said three layers of magnetic layer/non-magnetic layer/magnetic layer of said magnetic pole tip layer have the same shape as viewed from top, and have an angle of extension of 5° to 45°.